

A NEW MEMBER OF THE CHLOROCOCCALES,
BILGRAMIA INDICA GEN. ET SP. NOV.
(CHLOROPHYCEAE) FROM INDIA

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ABSTRACT - A new genus, *Bilgramia* gen. nov. (Chlorococcales) has been reported from India. The alga has a characteristic cruciate arrangement of cells with a hollow space in the centre of the coenobium. Colonies are interconnected by intercolonial mucilaginous strands. Several successive synchronous divisions along with different modes of reproduction have been observed. Since the alga exhibits a combination of characters of both the family Scenedesmaceae and Dictyosphaeriaceae, therefore, it has been proposed to be a new genus.

RÉSUMÉ - Un nouveau genre, *Bilgramia* gen. nov. (Chlorococcales) a été trouvé en Inde. La disposition cruciée des cellules avec un espace libre au centre du cénobe est caractéristique de cette espèce. Les colonies sont reliées entre elles par des filaments mucilagineux. Une succession de divisions synchrones ainsi que différents modes de reproduction ont été observés. Cette algue présentant une combinaison de caractères de deux familles, les Scenedesmaceae et les Dictyosphaeriaceae, un nouveau genre est proposé. (traduit par la rédaction).

KEY WORDS : *Bilgramia* gen. nov., Chlorophyta, Chlorococcales.

INTRODUCTION

The subfamily Crucigenioideae (family Scenedesmaceae) is represented by 8 genera viz., *Hofmania* Chodat = *Komareckia* Fott, *Danubia* Hindak, *Westella* De-Wild., *Pseudotetrastrum* Hindak, *Tetrachlorella* Kors., *Crucigenia* Morren, *Cruciginella* Lemm., *Tetrastrum* Chodat, *Willea* Schmidle (Philipose, 1967; Hindak, 1977; Lund, 1962; Yadava & Pandey, 1980, 1983; Yadava *et al.*, 1985). In the present study another new genus *Bilgramia* gen. nov. has been reported.

MATERIAL AND METHODS

The alga was collected from a fresh water ditch lying at latitude 25°30'N, longitude 81°40'E at Chakniranjan, Varanasi, India. The alga was found in a small ditch which usually accumulates rain water. The alga ap-

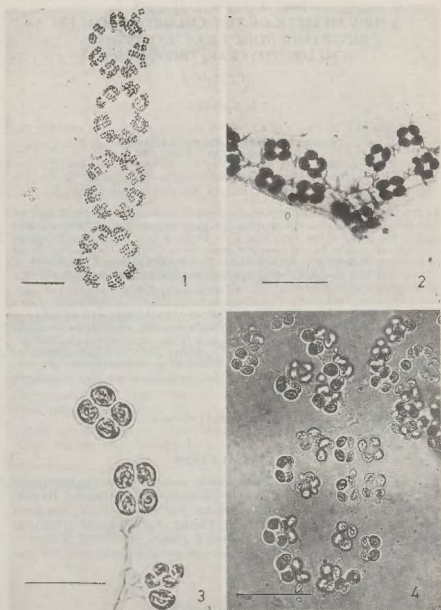


Fig. 1 and 4: Colonies from nature. Fig. 1: scale = $100\mu\text{m}$; Fig. 4: scale = $8\mu\text{m}$. Fig. 2: Colonies stained with gentian violet showing connecting strands. Scale = $10\mu\text{m}$. Fig. 3: Few magnified colonies with their cells having chloroplast and pyrenoids. Scale = $15\mu\text{m}$.

peared as a phytoplankton of a light pale-green colour. It was isolated and grown in unialgal culture in liquid and solid Bold's medium (1949), providing controlled temperature at $21 \pm 1^\circ\text{C}$ under illumination of 2000 lux.

DESCRIPTION OF THE ALGA

The colony is composed of a number of coenobia (Fig. 1). The basic unit of thallus is coenobium. A coenobium is typically formed of 4 cells, but later on due to formation of autocolonies in each individual cell the colony becomes a multicellular structure. The number of cells in a colony may reach upto 800 or more (Fig. 1). Colonies remain held together by mucilaginous strands and forming a long chain of a multiple or compound colony (Fig. 1, 4). Whenever a cell forms an autocolony attached to one another in a chain of mucilaginous strands which can be well detected by staining with India ink.

Cells of a colony are cruciately arranged leaving a quadrangular space in the centre (Figs. 2, 5). The cells are ovoid in shape and have contacts with the adjacent ones by mucilage (Fig. 3). Cells are $3.7\text{--}14\mu\text{m}$ broad, $4\text{--}10\mu\text{m}$ long and the 4 celled colonies are 7 to $14\mu\text{m}$ broad, 8 to $10\mu\text{m}$ long (Figs. 8, 9, 10, 11). Cells have a single parietal chloroplast with a pyrenoid filling up almost the entire space of the cell. A four celled colony reproduces by formation of autocolonies and each cell may function as a mother cell. Usually all the cells of a colony produce autocolonies almost simultaneously but in some cases only one, two or three cells behave as mother cells to produce autocolonies (Figs. 9, 10, 11). During this process the protoplast of a mother cell divides simultaneously by two cross walls at right angles to each other and results into 4 celled autocolony (Fig. 11, 12, 13).

CULTURAL OBSERVATION

In solid medium, the central quadrangular space of a coenobium get reduced whereas in liquid medium central quadrangular space remains the same as it was in natural conditions (Fig. 6, 7). Some additional observations were also recorded in cultures grown on solid medium. Individual cells acquire different shapes. Single cells enlarge in size and fail to divide and form a club shaped structure (Fig. 25, 26, 36). Some cells also attain the shape of horse shoe (Figs. 22, 28, 29, 31, 32). In certain other cases it has been observed that certain cells swell and secrete mucilage around themselves. Such large cells may be upto $16\mu\text{m}$ in diameter (Figs. 14, 18). The contents of such thick-walled perenating cells may divide into two, followed by more divisions in the longitudinal plane resulting into 8 to 32 celled stage (Figs. 17, 20, 21, 24). However, such perenating cells with as many as 32 places of protoplast are not recorded in other genera of the group.

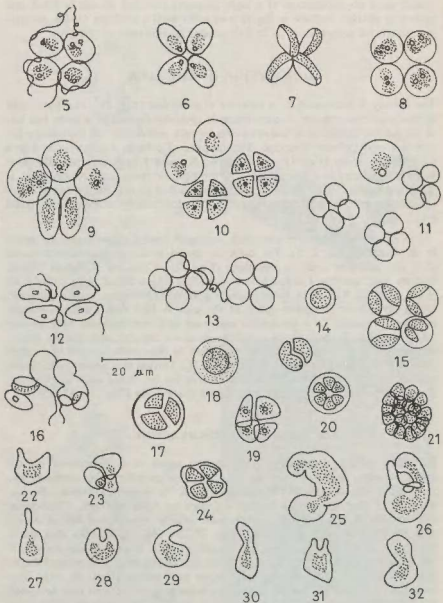


Fig. 5-8 and 18: four celled basic units of the colonies in culture. Fig. 9-11: Various stages in formation of autocolonies in culture. Figs. 12, 13 and 16: Colonies with thread like remnants in culture. Fig. 14, 17-21: Stages of the division of perenating cells in solid medium. Fig. 22-32: Cells are in different shape and size due to cultural variations.

DISCUSSION

Crucigenioideae is subfamily under the family Scenedesmeaceae in which only three genera, i.e. *Hofmania*, *Crucigenia* and *Tetrastrum* have been mentioned by Philipose (1967) from the Indian region. Later on Hindak (1977) listed six more genera i.e. *Danubia*, *Westella*, *Pseudotetrastrum*, *Tetrachlorella*, *Crucigeniella*, and *Willea*. Presently described alga has similarity with genus *Hofmania* = *Komarekia* Fott; Fott (1981) described three species of the genus, i.e. *K. lauterbornii*, *K. appendiculata*, and *K. rotundata*. The described alga may be placed under the subfamily Crucigenioideae because of its 4-celled colonies and with cruciate arrangements of cells. The basic number of cells per colony is 4, situated in one plane. The four cells are arranged cruciately/quadrately as in *Crucigenia*. The four cells lie close to one another or in direct lateral contact. Therefore, this alga has been put in the above family. But on the other hand it shares the characters of family Dictyosphaeriaceae, because mucilage strands arising from cell wall fragments that give an impression of *Dictyosphaerium* and allies. However, there the colony structure is radial whereas this alga like *Komarekia* is quadrate, cruciate, so it is related to *Crucigenia* and allies.

Indeed, this alga possess its own generic characters i.e. the organisation of colonies are held together in an orderly manner by intercolonial mucilage strands forming a compound colony. Colony is quite large in size (upto 800 cells). It also is evidence of several successive synchronous divisions with different mode of reproduction. Since the alga exhibits a combination of both Crucigenioideae and Dictyosphaeriaceae therefore, it has been proposed as a new genus *Bilgramia* gen. nov. under subfamily Crucigenioideae in the name of notable Botanist Prof. K.S. Bilgrami.

Latin diagnosis of *Bilgramia* gen. nov.

Colony composed of number of coenobia. Coenobia typically 4-celled. Coenobia remain held together by intercolonial mucilage strands. Colony is quite large in size. Several successive synchronous divisions are common feature of reproduction, which is new mode of reproduction.

Colonia e numerosis coenobiiis typice tetracellularis composita. Coenobia per vestigia cellularum quae catenas longas filiorum mucosorum formant, contentia. Cellulae cruciate dispositae, spatium quadrangulare reliquentes. Multiplicatio simultanea per autocolonias effecta.

Typus generis: Bilgramia indica sp. nov.

Latin diagnosis of *Bilgramia indica* sp. nov.

4 celled coenobia measure from 20-24 μ m in diameter and individual cells from 4 to 8 μ m broad and 6 to 10 μ m long. Each cell has parietal chloroplast with a pyrenoid. Reproduction by autocolonies and percnating cells. Synchronous divisions are common feature. Type locality: growing in the form of bloom in a small ditch, village Chaknirajan, Varanasi, U.P. India.

Coenobiorum tetracellularium usque ad 20-24 μ m diameter, cellulae usque ad 4-8 μ m latitudo, 6-10 μ m longitudo. Omnes cellulae cum uno parietale chloro-

plasto cum pyrenoide. Multiplicatio per autocolonias et cellulas perennantibus effecta.

Locus typi: Typus ut "aquiflorem" abundantem in fossa parva colens, in vico Chakniranjan, Paga Varanasi dicto.

Specimen typi: specimen typicum (D.C. P. 36) in Departamento Botanico, Universitatis Allahabadis, Allahabad depositum.

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